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MORBIDITY STATISTICS OF HOSPITALS.

THE NEED FOR MORBIDITY STATISTICS OF GENERAL HOSPITALS, SPECIAL HOSPITALS, SANATORIA, ETC., AND MEANS FOR THEIR COLLECTION AND PUBLICATION.¹

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Historical Aspects of Hospital Morbidity Experience.

Systematic inquiry into the morbidity statistics of hospitals seems to have been established a little more than a half century ago in England through the efforts of Florence Nightingale and Dr. Farr. Civil and military hospital administration of that day was confronted with the definite and acute public-health situation of a scandalously high mortality of patients from the so-called "hospital diseases"—septicemia, gangrene, and erysipelas—and with a growing public demand for radical changes in hospital construction and management. For one thing, mortality among hospital patients, especially in large cities, was very much higher than among patients suffering from the same classes of diseases out of hospitals.

In 1858 Miss Nightingale drew up a standard list of diseases and conditions (selected from the Farr-d'Espine system) and a set of uniform statistical tables adapted for use in the tabular abstraction of experience data of individual hospitals. These two fundamentals in hospital morbidity statistics she urged in a paper before the National Association for the Promotion of Social Science as points of agreement for the cooperative study of the sanitary aspects of hospital experience with the several diseases and conditions. These she proposed to consider in relation to defects of (1) undue agglomeration of patients under one roof, (2) deficiency of space per bed, (3) deficiency in ventilation and light, and in relation to auxiliary problems of hospital sites, plumbing, the preparation of food for patients, the training of nursing personnel, and the equipment of wards.

In 1859 a number of London hospitals were persuaded to experiment with the proposed statistical system. On the basis of the experience with this nomenclature and classification and with the set of uniform tabulation forms, a paper was prepared for the section on sanitary statistics of the International Statistical Congress in London, 1860. The paper was approved by the congress and was afterward extensively circulated among physicians and hospital officials. Large quantities of the forms were supplied to hospitals in various parts of the United Kingdom. The Paris hospitals took up the plan; Guy's Hospital, London, prepared a statistical examination of its experience for the years 1854 to 1861; the St. Thomas Hospital study covered the years 1857 to 1860. St. Bartholomew's

¹ Read before the annual conference of State and Territorial Health Authorities with the United States Public Health Service, Washington, Apr. 30 and May 1, 1917.

Hospital analyzed its records for 1860. At a meeting held at Guy's Hospital on June 21, 1861, it was unanimously agreed to adopt a uniform plan of registration, that each hospital should publish its statistics annually, and that the forms designed by Miss Nightingale should be used so far as practicable. The noteworthy statistical investigations of Dr. J. C. Steele¹ and Dr. William A. Guy² probably issued directly from Miss Nightingale's suggestions.

The 1858 paper by Miss Nightingale had a wholesome effect upon hospital construction and administration in the United Kingdom. Miss Nightingale recorded in 1863: "Since the publication of the first edition of that paper, great advances have been made in the adoption of sound principles of hospital construction; and there are already a number of examples of new hospitals realizing all, or nearly all, the conditions required for the successful treatment of the sick and maimed poor."³ Our pavilion system of hospital construction and the modern institution of trained nursing date practically from this period of reform in hospital construction and management, founded upon an impartial and complete analysis of institutional sickness experience.

Discussion of hospital morbidity experience and its underlying problems of nomenclature and classification of diseases and of ways and means of properly presenting data, has proceeded through the half century or more since the fundamentals were outlined by Florence Nightingale.

In America, we are indebted to Dr. Henry Brooks Baker for an able treatment of our general subject in his "Sickness Statistics Report of the Committee on Vital Statistics of the National Conference of State Boards of Health" in 1892; to the National Board of Health in 1880 for an attempt to construct a nomenclature and classification of diseases for use in the United States; and to Bellevue and allied hospitals for a nomenclature and classification adapted to the International List of Causes of Sickness and Death. Quite recently, Dr. Charles Frederick Bolduan⁴ suggested a mode of collecting hospital medical statistics in a large city. Mr. Frederick L. Hoffman's "Statistical Experience Data of the Johns Hopkins Hospital, 1892 to 1911,"⁵ is the latest American treatise on the general principles and practice of hospital statistics.

¹ "Mortality of Hospitals, General and Special, in the United Kingdom in Times Past and Present." Jrl. Royal Stat. Soc., June, 1877.

² "Mortality in London Hospitals." Jrl. Royal Stat. Soc., April, 1867.

³ Nightingale, Florence. "Notes on Hospitals." 3d edition, 1863.

⁴ "Hospital Morbidity Statistics." New York Medical Journal, Mar. 29, 1913.

⁵ Johns Hopkins Hospital Reports. Monographs. New series, No. IV, 1913.

Need for a Federal Voluntary Registration Area for Hospital Morbidity Statistics.

Problems in the public health aspects of modern hospital economy—in the efficient administration of hospitals and the adaptation of hospital systems to established community needs—are still far from being considered in the impartial light of collected statistical experience. The hospital situation in a medical center like Philadelphia, for instance, can not be appraised in terms of public health values for lack of comprehensive and informing records of the experience data. Any endeavor to ascertain the degree of correspondence between the hospital results for the more important diseases and conditions and the community fatality rates for these diseases and conditions must end in failure because of fundamental deficiencies in the available hospital reports. The comparative efficiency of the several hospitals attached to the various centers of medical education and research in that city can not be even approximately determined. In the published reports of the University Hospital in Philadelphia, for instance, the different departments employ systems of nomenclature and tabular presentation utterly at variance with each other. This makes it impossible to determine the complete experience of even this single hospital with respect to any one disease or a group of diseases and conditions.

Similar confusion exists in other large cities of the United States. Hospital care of sickness as a public health measure is at present without any adequate gauge.

The proper preparation of hospital statistical data should be viewed by public health workers as an additional step toward one ideal of preventive medicine—the continuous and complete registration, for purposes of reflective analysis, of all serious sickness. Approval of the model State law for morbidity reports by this conference four years ago at Minneapolis was a positive move in this direction. The registration and statistical analysis of hospital morbidity data in a Federal voluntary area can be accomplished if a sufficient number of representative general and special hospitals will agree (*a*) to adopt in common a nomenclature and classification of diseases and conditions and (*b*) if they will transmit to a central Federal agency detailed tabulations of their sickness experience upon a set of uniform reporting schedules. These fundamentals will be considered in some detail.

Standard Nomenclature and Classification of Diseases.

At present, the Bellevue and Allied Hospitals (New York City) nomenclature of diseases and conditions is the one most in favor for use in a cooperative statistical study of hospital morbidity experience. The existence of other and supplementary systems of nomenclature and classification, each with its special excellencies, the outgrowth of

contact with original situations not within the purview of Bellevue experience, suggests the construction of a standard manual for the use of American hospitals, based upon agreement between the several systems. Attention is directed to the possibility of combining the joint excellencies of the forthcoming report of the United States Public Health Service Board of Nomenclature, the United States Public Health Service tentative nomenclature of diseases and conditions and of parasites and parasitic diseases, the United States Navy classification of injuries, the nosologic system of the International Commission for the Unification of the Medical Statistics of Armies (Berlin agreement, 1907), the International Association of Industrial Accident Boards and Commissions' classification of injuries (by location, nature, and extent of injury and degree of disability), and the International List of Causes of Sickness and Death as used by the Census Bureau, the United States Army, Massachusetts General Hospital, and by Bellevue Hospital. Details of classification methods can not be referred to here. These must be left to a competent committee of nosologists. The practical working of an approved system of nomenclature and classification in a group of representative hospitals will benefit the hospitals themselves by eliminating much of the present confusion over record filing and finding. Physicians trained in these hospitals will go into private and other practice with an adequate conception of the urgency of consistency in the use of medical terms. This will favorably affect the vital statistics prepared from the birth, death, and sickness reports submitted by these physicians later on in general practice.

Schedulizing the Data.

As a basis of experimental procedure I would suggest the schedule plan which was so eminently successful in England during the early 1860's. The preparation of fairly complete displays of hospital sickness experience, in a series of fundamental tables, rather than the complete transcription of the original case record, is indicated for purposes of a voluntary Federal Registration Area. Individual hospitals may wish at the same time they report their experience to the central agency, to prepare an "annual report" for themselves.

The transcription of items from the basic hospital record card and the compilation of the statistics from this "transcript" in the central Federal clearing agency for these public health data, should not be attempted at the beginning, but only after the need for such transcription has been definitely established. The standardization of case record and discharge record forms may or may not be indicated by practical experience. Clerical and printing costs will be saved at the outset, it is believed, by placing emphasis only on standardization of nomenclature and of the tabulation schedule upon which the

individual hospital should report its experience. Hospitals will be the more ready to agree to enter a voluntary Federal registration area if such action will not seriously disturb present record routine or run up clerical costs.

The tabulation of hospital experience in its public health aspects should recognize, at the outset of the experiment, only the chief items of disease or condition in relation to sex and age and to condition on discharge. The entire experiment should not fail because of initial over-emphasis upon relatively unimportant statistical detail. The successful experiment in England recognized seven "primary tabulation elements":

1. Patients remaining in hospital on the first day of the year.
2. Admitted during the year.
3. Discharged as "recovered," "improved," or "relieved" during the year.
4. Discharged as "incurable," "dying," "unrelieved," for irregularities, or at own request.
5. Died during the year.
6. Remaining in hospital on the last day of the year.
7. Mean duration of cases in days and fractions of a day.¹

Each of these "elements" could be presented as a table, duly classified in the stub or left-hand side of the table by disease or condition according to the accepted nomenclature, and by sex and age period in the boxheadings at the top of the table. The age classification might be chosen so as to show cases of sickness by single months under three months of age, by quarters thereafter up to one year and by single years up to five. After five years, quinquennial periods might be shown up to age twenty-five, then by 10-year periods up to the very advanced ages. This classification could be readily converted, for purposes of international comparative hospital morbidity statistics, into the distribution of ages outlined in the "standard million" of population in England and Wales in 1901.

The individual hospital could prepare two copies of these primary tabulation schedules, (1) for transmission to the central Federal agency and (2) for the preparation of that hospital's own report to its trustees or board of managers. The schedules submitted by the cooperating hospitals to the central agency could be economically combined under modern statistical practice as required by the publication program. The material displayed on the primary schedules permits the computation of the various "discharge" or "disposition" rates by sex and age for the diseases and conditions in the experience, on the basis of "mean number of sick under treatment."

¹ A slightly different mode of tabulating these data is recommended: (a) Either the sum of "hospital days" can be entered in the disease-sex-age categories, or (b) cases may be classified by "days in hospital" in each disease-sex category without respect to age period. The first method would facilitate the computation of "mean duration of cases in days" for the aggregate experience.

End Results of a Voluntary Registration Area.

The statistical development of the tabulated data submitted to the central Federal agency would afford, for the first time in America, some foundation for a comparative public health study of hospital results. The relative efficiency of the several types of general hospitals, of systems of nursing, and of modes of treatment can be determined by competent statistical study of sufficiently representative hospital morbidity data. Hospital experience with the several diseases and conditions may or may not be correlative with the general facts of community vital statistics. Only a presentation and study of the data from both sources can determine the place of hospital care of sickness in the public health movement. What is the effect of an improvement in hospital results for pneumonia, as an instance, upon the death rate of this disease? Has a decline in puerperal sepsis and other abnormal puerperal conditions in hospital experience affected the general facts of maternal mortality in the community at large? These are only two stated public health problems which await statistical data of general hospital experience; there are, of course, numerous others at present without means of solution. These problems will be fully stated, no doubt, as soon as it becomes known that data for their study are to be made available.

Statistical Problem of the Special Hospital.

Hospitals and sanatoria for the exclusive treatment of tuberculosis, mental diseases, cancer, drug addiction and other special diseases, have an opportunity for service to their individual fields and to the public health movement.

Tuberculosis.

Professor Karl Pearson in his "The Fight against Tuberculosis and the Death Rate from Phthisis" questions the place of sanatorium treatment of tuberculosis in the general movement for the study and control of the disease.¹ Dr. Lee K. Frankel in his "Plea for a Federal Commission on Tuberculosis" asks us to reassemble our facts on the public health aspects of tuberculosis and determine whether we should proceed along the lines we have laid down or establish new criteria, and new bases for future action.² The special hospitals for tuberculosis should, therefore, enter upon a comprehensive cooperative effort to study their experience data.

¹ Publications of Department of Applied Statistics, University College of London, "Questions of the Day and of the Fray" Series, No. IV, 1911. Also in "Tuberculosis, Heredity and Environment," Eugenic Laboratory Lecture Series, No. VIII, University College of London, Galton Laboratory for National Eugenics, 1912.

² Paper read at Mississippi Valley Conference on Tuberculosis. Sept. 30, 1915. Reprinted by Metropolitan Life Insurance Company, New York City.

The tuberculosis hospitals have the advantage of considerable preliminary work in the standardization of nomenclature through the work of the National Association for the Study and Prevention of Tuberculosis and of the American Sanatorium Association. This work can be made to bear fruit in a cooperative statistical study in association with the Federal voluntary registration area for hospital morbidity statistics.

Mental Diseases.

The vital statistics of hospitals for the treatment of mental diseases have received the close attention of the American Medico-Psychological Association. That organization has a committee on uniform statistical reports; the committee agreed on February 28 and March 1, 1917, upon a nomenclature of mental diseases and upon a set of standard statistical forms for cooperative study. The report of the committee is to be submitted to the general association at its meeting in New York on May 29, at which time the American Medico-Psychological Association will be asked to appoint a standing committee to further the cause of statistical study of mental diseases. A "Registration Area for the Study of Mental Diseases," organized in State groups of hospitals, has been suggested. The admirable statistical reports of the New York State Hospital Commission point to the ultimate success of a broad program of mental disease study. Such a program could very well be incorporated in the "Federal Voluntary Registration Area for Hospital Morbidity Statistics." The control of serious mental ailments is a contemporary public health problem which depends in some degree upon a presentation of the facts through cooperative statistical enterprise.

Cancer.

Dr. E. F. Bashford, director of the Imperial Cancer Research Fund,¹ has suggested means for the systematic utilization of the facts available in cancer hospitals through uniform record forms and the subsequent analysis of the data in a central agency. Mr. Frederick L. Hoffman² points out the value of comparable and trustworthy data of cancer hospitals in the service of cancer study and control. The American Society for the Study and Control of Cancer, through a special committee, has had drawn up a standard blank for hospital cancer records which it recommends for general adoption. The proposed Federal voluntary registration area for hospital morbidity statistics affords opportunity for cooperative study of the disease and for the dissemination of the tabulated data to research workers in the field.

¹Statistical Investigation of Cancer; Second scientific report of the Imperial Cancer Research Fund. Part I. London, 1905, p. 10.

²"Mortality from Cancer throughout the World," pp. 158-161.

Cooperating special hospitals and sanatoria could use the nomenclature of diseases and conditions outlined for general hospitals in association with standard manuals covering their special subjects.

A beginning has been made in the cooperative statistical study of hospital sickness experience in New York City. Upon Dr. Charles F. Bolduan's suggestion, the interest of the New York City hospitals in the project was aroused. The entire matter of the clerical expense of editing the discharge certificates, of punching statistical cards, and of tabulating the data is at present under consideration. The Metropolitan Life Insurance Co. has offered the use of its statistical facilities, including the editing of certificates, preparation of cards, tabulation of the data, and the supervision of these processes. This study promises statistical results of great value in the public health work of New York City and elsewhere.

When the idea of a Federal voluntary registration area for morbidity statistics was first advanced in the preliminary deliberations of the American Public Health Association Committee on Relations of the 1920 Census to Vital Statistics, it was proposed to collect the data for the next census year through the United States Public Health Service. It is desirable to commence at an early date the active work on the formation of the area through the Public Health Service. The solution of nomenclature and schedulizing problems¹ should be accomplished well in advance of the census year. There are practical difficulties to be encountered and overcome; the working of the cooperative system of registration should be assured by one year, at least, of preliminary experience in the use of the nomenclature. It would be practicable, the writer believes, to have this nomenclature and classification prepared, and the agreements with the hospitals drawn up before January 1, 1919. This would provide a full calendar year of experience before the plan suggested in a preliminary way by the American Public Health Association committee would go into effect during the census year.

¹ The schedulizing suggestions in the earlier part of this paper are manifestly not final in detail. More or less development of the material may be decided upon for some city groups of hospitals, and certainly for special hospitals. Color of patients, medical, surgical, obstetrical, and other classes of patients, "free" and "pay" lists, might be distinguished. Preliminary conference will dispose of these points.